# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-295629

(43)Date of publication of application : 26.10.2001

(51)Int.Cl. F01N 3/02
B01D 46/30
B01D 46/42
F02D 41/04
F02D 41/06

(21)Application number : 2000-114070

(22)Date of filing : 14.04.2000

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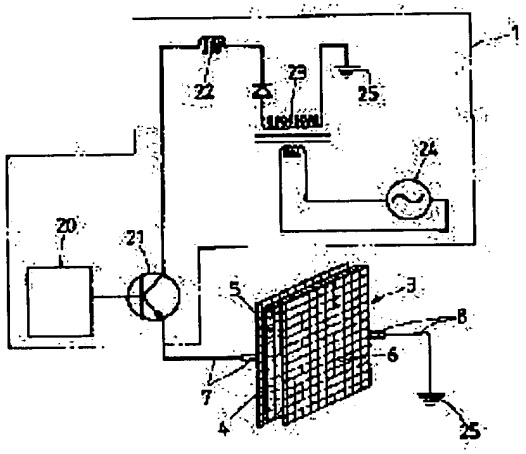
## (54) DPF DEVICE FOR CAUSING REACTION AND DISAPPEARANCE OF PARTICULATE MATTER BY MEANS OF PLASMA

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a DPF(diesel particulate filter) device for causing particulate matters collected by a filter to react and disappear by utilizing plasma energy, so that the filter is regenerated.

SOLUTION: In this DPF device, an upstream screen 4 located on the upstream side and downstream screen 6 located on the downstream side are insulated electrically from a filter body 5 forming the filter 3. Particulate matters collected by the filter 3 are caused to react and disappear, by plasma energy in order for the filter 3 to regenerate. A plasma generator 1 generates plasma, by increasing voltage of power from a generator with a transformer 23, rectifying the power with a rectifying coil 22, performing on/off operation of signals transmitted by a high-frequency oscillator 20 through a power transistor of an interrupter 21 to generate alternate power, and then intermittently applying high-frequency direct current on both screens 4, 6 at a high voltage.

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CLAIMS

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[Claim(s)]
[Claim 1] Casing included in the exhaust pipe with which the exhaust gas from an engine is discharged, The particulate matter contained in said exhaust gas arranged in said casing between the upstream electrode which has been arranged, respectively to both sides of the filter made from the ceramics which carries out uptake, and said filter and which was insulated electrically, a downstream electrode, and said upstream electrode and said downstream electrode The exhaust gas purge which consists of carrying out reaction disappearance of said particulate matter in which possessed the plasma generator which impresses the interrupted current of a RF intermittently by the high voltage, and is made to generate the plasma between said upstream electrodes and said downstream electrodes, and uptake was carried out to said filter by said plasma.
[Claim 2] Said body of a filter is DPF equipment according to claim 1 characterized by being formed in the laminated structure which carried out the laminating of the non-conductive ceramic fiber material at random.
[Claim 3] The metal member which constitutes said electrode is DPF equipment according to claim 1 characterized by having prevented that it will be in an energization condition by said particulate matter by which was covered with ceramic coating or porcelain enamel processing in insulation, and uptake was carried out to said filter.
[Claim 4] The metal member which constitutes said electrode is DPF equipment according to claim 1 characterized by being formed from the wire gauze or the metal perforated plate.
[Claim 5] Said wire gauze is DPF equipment according to claim 4 which a vertical line and striping cross and a laminating is carried out, and is characterized by connecting by turns by a part of intersection of said vertical line and said striping so that an electrical-potential-difference difference may not occur between said vertical lines and said striping.
[Claim 6] Said body of a filter is DPF equipment according to claim 1 characterized by bending the fiber filter by which the laminating was carried out in the shape of a fold, being formed in an annular filter as a whole, and sending said exhaust gas into an inner circumference side from the periphery side of said annular filter.
[Claim 7] The power source which generates the high voltage in the high frequency impressed to said upstream electrode and said downstream electrode with said plasma generator is DPF equipment according to claim 1 characterized by using the power generated with the generator formed in said engine.
[Claim 8] Said plasma generator carries out the pressure up of the electrical potential difference from an AC generator by the transformer, and a rectification coil rectifies the high voltage by which the pressure up was carried out, and the rectified high voltage with the RF signal from a high-frequency oscillator DPF equipment according to claim 1 which carries out on-off control of the contact breaker, and is characterized by generating the alternation-like RF high voltage, impressing said RF high voltage between said upstream electrodes and said downstream electrodes, and generating the plasma.
[Claim 9] The fuel-injection timing of said engine is delayed and it is NOX. It is NOX in said plasma which is made to increase generating of HC and is generated in inter-electrode [ said ] while making generating control. HC is made to react and it is NOX. DPF equipment according to claim 1 characterized by reducing generating.
[Claim 10] When the circulating water temperature of an engine load immediately after the time of a partial load and starting is low, it is impressed by said electrode, and the plasma is generated, reaction disappearance of the particulate matter is promoted by plasma energy, and said plasma generator is NOX. DPF equipment according to claim 1 characterized by promoting a reaction with HC.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the diesel particulate filterrig, i.e., the DPF equipment, which uptake of the particulate in the exhaust gas discharged from a diesel power plant is carried out [ equipment ], and carries out reaction disappearance of the particulate matter using the plasma.
[0002]
[Description of the Prior Art] The exhaust-gas processor which processes engine exhaust gas conventionally attaches a heating coil to a filter while forming greatly the area of the filter arranged in the exhaust pipe, it makes particulate matter, such as the carbon contained in exhaust gas, deposit on the front section of a filter, carries out uptake, it energizes a heating coil, heats the carbon subsequently to a filter deposited, carries out the heating combustion of the carbon, incinerates, and is reproducing a filter.
[0003] For example, the diesel particulate filterrig indicated by JP,1-144427,U Carry out uptake of the particulates, such as carbon in exhaust gas, and a smoke, by through and this body of a filter at the body of a filter, and a particulate deposits exhaust gas on the body of a filter. When blinding is carried out, it intercepts passing exhaust gas on the body of a filter, and air is sent in from the downstream of the body of a filter which switched and carried out blinding so that exhaust gas may be passed on another body of a filter, and the particulate which is heating and carrying out blinding of the body of a filter is incinerated.
[0004]
[Problem(s) to be Solved by the Invention] the inside of the exhaust gas discharged from a diesel power plant -- carbon, a smoke, and HC and SOX etc. -- although the particulate matter, i.e., SPM, is contained -- SPM -- the compost of carbon and a hydrocarbon -- it is -- a thing small from a particle with the very large magnitude -- it is the range of 40 micrometers - 0.1 micrometers particle size, and there are many about 20-micrometer things and, specifically, the thing of such sizes is distributing in exhaust gas. Especially, in the size of SPM, on the environment, I hear that a thing with a small particle size of 2.5 micrometers or less has a bad influence on the bodies, such as asthma, and it is made into the problem.
[0005] However, when carrying out uptake of the SPM of a particle with a diesel particulate filterrig, i.e., DPF equipment, it is very difficult for there to be a possibility that a particle may pass through the crossover space between the fiber of a fiber filter, and may be discharged, and to carry out uptake of the particle with these filters. Then, it has been a big technical problem also from from [ when preventing air pollution ] to carry out uptake of the SPM with these small particle diameter.
[0006] Moreover, if oxygen exists and it is heated by about 600 degrees C or more, SPM by which uptake was carried out with DPF equipment reacts with oxygen, can burn easily and can be made to incinerate. So, it is necessary to have the function which carries out heating incineration of the SPM by which uptake was carried out by the body of a filter, and can reproduce the body of a filter to DPF equipment. Then, since the body of a filter is reproduced, exhaust gas is energized with a sink on the body of a filter at a wire gauze, and it is possible to change the temperature up of the temperature into the combustion condition of SPM. Moreover, when a filter is produced for ceramic fiber, SPM accumulates between fiber. Since SPM deposited between the fiber for filters to which the laminating of the ceramic fiber was carried out at random is deposited in three dimensions, a clearance is easy to be formed between SPMs, and between SPMs will be applied, it will be easy to pass exhaust gas, and SPM will carry out ignition combustion with the air included in exhaust gas.
[0007] By the way, the plasma is the discharge current and is the phenomenon which can do between gases by forward [ which exercises freely ], and the negative charged-particle group. Then, it constitutes from maintenance material made from a wire gauze on the body of a filter which carried out the laminating of the

ceramic fiber which does not have energization nature in DPF equipment, and its both sides, and forms in the barrel structure bent in the shape of a fold as a whole, and if the wire gauze of the both sides of the body of a filter is constituted in an electrode and the load of the high voltage is carried out to a wire gauze by the RF, the plasma can be made further generated between two electrodes.

[0008]

[Means for Solving the Problem] The purpose of this invention the above-mentioned problem It is solving. A filter Pinch the body of a filter constituted from ingredients, such as ceramic fiber to constitute, from the both sides by the metal member which consists of a wire gauze, a porous metal plate, etc., constitute the metal member of the both sides of the body of a filter in an electrode, carry out the load of a RF and the high voltage to inter-electrode, generate the plasma, and plasma energy is used. It is offering, the diesel particulate filterrig, i.e., the DPF equipment, which carries out reaction disappearance of the particulate matter, i.e., SPMs, by which uptake's is carried out to the filter, such as a particle.

[0009] This invention Casing included in the exhaust pipe with which the exhaust gas from an engine is discharged, The particulate matter contained in said exhaust gas arranged in said casing between the upstream electrode which has been arranged, respectively to both sides of the filter made from the ceramics which carries out uptake, and said filter and which was insulated electrically, a downstream electrode, and said upstream electrode and said downstream electrode The interrupted current of a RF is intermittently impressed by the high voltage. Between said upstream electrodes and said downstream electrodes The plasma generator made to generate the plasma is provided and it is related with the exhaust gas purge which consists of carrying out reaction disappearance of said particulate matter in which uptake was carried out to said filter by said plasma.

[0010] Said body of a filter is formed in the laminated structure which carried out the laminating of the non-conductive ceramic fiber material at random.

[0011] It has prevented that the metal member which constitutes said electrode will be in an energization condition by said particulate matter by which was covered with ceramic coating or porcelain enamel processing in insulation, and uptake was carried out to said filter.

[0012] The metal member which constitutes said electrode is formed from the wire gauze or the metal perforated plate. When said electrode is constituted from a wire gauze, a vertical line and striping cross, a laminating is carried out, and said wire gauze is connected by turns by a part of intersection of said vertical line and said striping so that an electrical-potential-difference difference may not occur between said vertical lines and said striping.

[0013] Said body of a filter bends the fiber filter by which the laminating was carried out in the shape of a fold, and is formed in an annular filter as a whole, and said exhaust gas is sent into an inner circumference side from the periphery side of said annular filter.

[0014] The power generated with the generator with which the power source which generates the high voltage in the high frequency impressed to said upstream electrode and said downstream electrode with said plasma generator was prepared in said engine is used.

[0015] Said plasma generator carries out the pressure up of the electrical potential difference from an AC generator by the transformer, rectifies the high voltage by which the pressure up was carried out with a rectification coil, carries out on-off control of the contact breaker for the rectified high voltage with the RF signal from a high-frequency oscillator, generates the alternation-like RF high voltage, impresses said RF high voltage between said upstream electrodes and said downstream electrodes, and generates the plasma.

[0016] The engine incorporating this DPF equipment delays fuel-injection timing, and is NOX. It is NOX in said plasma which carries out control to which generating of HC is made to increase, and this DPF equipment generates in inter-electrode [ said ] while making generating control. HC is made to react and it is NOX. Generating is reduced.

[0017] When the circulating water temperature of an engine load immediately after the time of a partial load and starting is low, it is impressed by said electrode, and the plasma is generated, reaction disappearance of the particulate matter is promoted by plasma energy, and said plasma generator is NOX. A reaction with HC is promoted and it is NOX. Generating is reduced.

[0018] Since this DPF equipment was constituted as mentioned above, and the load of the intermittence high voltage of a RF is carried out to inter-electrode [ of the metal member of the both sides of the body of a filter ], the plasma state follows inter-electrode and it is made to generate The particulate matter (SPM) of the particle which exists in inter-electrode [ by which uptake was carried out to the filter ] It will be in a radical (free radical, free radical) condition by plasma energy, and the particulate matter is electronic e- and e+. Emitting, HC is CO2 as H2 O. Changing, C is CO2. While changing, some particulate matter is lit, and

it burns and is incinerated.
[0019] For example, when a wire gauze is constituted at a heater, the heat in a wire gauze spreads, SPM and black carbon are lit, the particulate matter burns, but since vibration by mixture of a forward anion gives energy to SPM and reacts to it in constituting a wire gauze in an electrode and generating the plasma like this invention, reaction initiation of the particulate matter occurs certainly. Once the particulate matter will be in a radical condition, it is O2 in exhaust gas. Since it reacts, C oxidizes and HC also oxidizes. In this condition, they are C, HC, and NOX. Coexistence generates the next reaction.
2 NO+CH->N2+H2 O+CO2 CO+O2 ->2CO2 -- in other words, NO will be returned as mentioned above. Since it generates between wire gauzes, power flux density concentrates and plasma energy increases the above-mentioned plasma state from a metal plate. Moreover, it will burn and move from the once lit SPM layer to the adjoining SPM layer, and all particulate matter will be incinerated.
[0020] Since plasma power is made to high-voltage-ize, if a winding ratio is set about to 75 to 150, the electrical potential difference of 5-30KVA can carry out the load of the current from the stator coil which carried out the serial continuation volume among both wire gauzes, so that the electrical potential difference of AC generator may be enlarged. The load of the high-voltage-ized power may be carried out as it is. Alternating current is once rectified, a power transistor can be made to be able to turn on and off by the on-off signal oscillated with the crystal oscillator, and the current on which the high voltage was intermittent can be made. Here, a frequency is 1MHZ. It is extent.
[0021]
[Embodiment of the Invention] Hereafter, with reference to a drawing, the example of the DPF equipment by this invention is explained. The circuit diagram showing a high-frequency oscillator [ in / the approximate account Fig. showing one example of DPF equipment according / drawing 1 / to this invention, the outline circuit diagram showing the plasma generator which prepared drawing 2 in the DPF equipment of drawing 1 , the approximate account Fig. in which drawing 3 shows the relation between the filter of DPF equipment and a plasma generator, and drawing 4 , and / in drawing 5 / the plasma generator of drawing 2 ], and drawing 6 are the circuit diagrams showing the contact breaker in the plasma generator of drawing 2 R> 2. [ the expansion explanatory view of the field of the sign I of the filter of drawing 3
[0022] This diesel particulate filterrig (henceforth DPF equipment) SPM by which was included in the exhaust pipe 51 which discharges the exhaust gas from the combustion chamber which constitutes an engine, and carried out uptake of the particulate matter (henceforth SPM) contained in exhaust gas with the filter 3, and uptake was carried out to the filter 3 with the plasma generator 1 It is O2 in exhaust gas by the generated plasma. While making it react and making it disappear, a part of SPM carries out ignition combustion, it destroys by fire, and purifies exhaust gas. The inlet-port 12 side of casing 2 is supported by the bearing bar 52, and the filter 3 is supported on the electric shielding plate 17 which equipped with the vent hole 53 the center section in which an outlet 13 side closes a filter edge.
[0023] The filter 3 is arranged so that the upstream exhaust gas path 14 and the downstream exhaust gas path 15 may be formed in the casing 2 included in the exhaust pipe 51. As a filter 3 is shown in drawing 3 , the fiber filter which was bent in the shape of a fold and by which the laminating was carried out is formed in an annular filter as a whole, and the upstream is closed by the electric shielding plate 17 in the filter down-stream end face, after the vent hole 53 has had consistency to the downstream exhaust gas path 15 where the filter upstream end face was closed by the electric shielding plate 16, and the downstream was formed in the center section. Therefore, the exhaust gas which flows an exhaust pipe 51 passes a filter 3 through the upstream exhaust gas path 14 by the side of the vent hole between bearing bars 52, and the periphery of a filter 3 from an inlet port 12, is discharged at the downstream exhaust gas path 15 by the side of inner circumference, and, subsequently is discharged from an outlet 13 to an exhaust pipe 51. the carbon contained in exhaust gas in a filter 3 in case the exhaust gas discharged from an engine passes a filter 3, a smoke, and HC and SOX etc. -- uptake of the SPM is carried out.
[0024] In case a controller 10 passes exhaust gas in a filter 3, it answers the uptake condition of SPM from the pressure sensor 9 formed in the upstream of a filter 3, and the pressure sensor 11 formed in the downstream, and the operational status of the engine from the rotation sensor 18 and the load sensor 19, adjusts the generating condition of the plasma by the plasma generator 1, and carries out control which SPM makes carry out reaction disappearance and ignition combustion, and is incinerated.
[0025] The filter 3 consists of wire gauzes 4 and 6 containing nickel which has corrosion resistance with the thermal resistance which put the both sides of the body 5 of a filter which fabricated non-conductive ceramic fiber excellent in thermal resistance and corrosion resistance to the felt material which carried out the laminating at random, and the body 5 of a filter, and was fixed, Cr, etc., as shown especially in drawing

4 . As shown in drawing 3 , a filter 3 is fabricated in a predetermined cartridge-like configuration with a fold as a whole, and is formed in the configuration to which surface area becomes large. At this time, as shown in drawing 4 R> 4, the insulating material 66 intervenes between the wire gauze 6 and the adjoining wire gauze 6, so that a wire gauze 6 and the adjoining wire gauze 6 may not short-circuit. A filter 3 can also be constituted in tubed [ of a cylindrical shape etc. ], plate-like, and the configuration of wavelike ** other than the shape of an above cartridge with a fold. The ingredient which constitutes a filter 3 is formed with the nonwoven fabric which carried out the laminating of Si3 N4 covered with SiC, the ceramic fiber of SiC (Si-C-O, Si-Ti-C-O, Si-C), and/or the fiber which covered carbon and an alumina with SiC at random, the diameter of fiber of ceramic fiber is about 5-15 micrometers, and die length is about 30-150mm. Moreover, as for the ceramic fiber material which carried out the laminating to the shape of felt, the thickness is formed in about 3-5mm, for example.

[0026] With this DPF equipment, the metal member which constitutes an electrode is formed from wire gauzes 4 and 6 or a metal perforated plate (not shown). While this DPF equipment arranges the upstream wire gauze 4 which constitutes an electrode in contact with the upstream side of the body 5 of a filter of exhaust gas flow, and the downstream wire gauze 6 which constitutes an electrode in contact with a downstream side and insulating electrically the upstream wire gauze 4 and the downstream wire gauze 6 The current of a RF is intermittently impressed by the high voltage, and the plasma is generated between the electrode of the upstream, and the electrode of the downstream, and while making SPM in which uptake was carried out to the filter 3 by the plasma react, ignition combustion is carried out and it is made to disappear.

[0027] Moreover, the wire gauzes 4 and 6 which constitute an electrode were covered with ceramic coating or porcelain enamel processing in insulation, and have prevented that it will be in an energization condition by the particulate matter by which uptake was carried out to the filter 3. Moreover, a vertical line and striping cross, a laminating is carried out, and wire gauzes 4 and 6 are connected by turns by a part of intersection of a vertical line and striping so that an electrical-potential-difference difference may not occur between a vertical line and striping. By constituting an electrode at wire gauzes 4 and 6, a plasma generating field is increased and plasma generating can be promoted. By generating of the plasma, the particulate matter is electronic e- and e+. Emitting, the hydrocarbon HC in exhaust gas is CO2 as H2 O. Changing, the carbon C in exhaust gas is CO2. While changing, some particulate matter is lit, and it burns and is incinerated.

[0028] It connects with AC generator 24 through Rhine 7, and the downstream wire gauze 6 is connected to the ground 25 through Rhine 8 so that the high voltage by which the plasma generator 1 was generated from AC generator 24 with the high-frequency oscillator 20 with which the plasma is generated by the plasma generating circuit shown in drawing 2 , and the upstream wire gauze 4 was equipped with the power source 28, i.e., a dc-battery, and the contact breaker 21 may be controlled. A pressure up is carried out to the high voltage predetermined by the transformer 23, and it is rectified by the rectification coil 22, and subsequently, the electrical potential difference of the high voltage is impressed between the upstream wire gauze 4 and the downstream wire gauze 6 by the RF which the contact breaker 21 was controlled by the output of a high-frequency oscillator 20, and was controlled by the contact breaker 21, and the electrical potential difference generated with AC generator 24 makes the field of the body 5 of a filter between the upstream wire gauze 4 and the downstream wire gauze 6 generate the plasma. It consists of a low power side [ two kinds ] generator which changed into size the number of turns of the coil which was able to be wound up to the stator core as AC generator 24, for example, and a high power side generator, and a high power side generator is used for the plasma generator 1 (for example, refer to the application for patent No. 113915 [ 2000 to ] which is application concerning these people).

[0029] High frequency is oscillated by the high frequency oscillator circuit which shows a high-frequency oscillator 20 to drawing 5 , the electrical potential difference from a dc-battery 28 is adjusted by the variable resistor 35, and a base electrical potential difference is inputted into the base of a transistor 26 for this electrical potential difference through a crystal oscillator 27 through RC circuit 29. If a base electrical potential difference is inputted into the base of a transistor 26, as for the current from a dc-battery 28, a signal will be sent for a RF as an output 34 from a terminal from a capacitor 33 through a transistor 26. In the high frequency oscillator circuit shown in drawing 5 , signs 30, 31, and 32 are capacitors, a sign 37 is a capacitor with diode and signs 38, 39, and 40 are resistance.

[0030] The contact breaker 21 which carries out intermittence control of the RF generated with the high-frequency oscillator 20 is formed in the RF intermittence circuit shown in drawing 6 . As for a high frequency intermittence circuit, an output 44 is taken out from a terminal through a transistor 41, as for a power source, i.e., the current from a dc-battery 36. The signal of an output 34 sent from the RF oscillator

circuit of a high-frequency oscillator 20 is impressed to the input 50 of a RF intermittence circuit, and is inputted as a base electrical potential difference of a transistor 42. The dc-battery 36 consists of AC generator 24, a transformer 23, and a rectification coil 22. If a base electrical potential difference is inputted into a transistor 42, a base electrical potential difference will be inputted into a transistor 41, and an output 44 will be taken [ the high voltage from a dc-battery 36 ] out with a RF for the interrupted current of the high voltage from a terminal through a transistor 41. The terminal which takes out an output 44 is with the upstream wire gauze 4 and the downstream wire gauze 6. In the high frequency intermittence circuit of drawing 6 , a sign 43 shows a transistor and signs 45, 46, 47, and 49 are resistance. That is, the electrical potential difference of the alternating current outputted from AC generator 24 is adjusted to the high voltage of a direct current by a transformer 23 and the rectification coil 22, and subsequently, the high voltage is controlled by the output signal of the RF controlled by the contact breaker 21, is impressed between the upstream wire gauze 4 and the downstream wire gauze 6, and generates the plasma.

[0031] The power generated with the generator with which it was formed in the engine, the power source, i.e., the dc-battery, made to generate the high voltage in the high frequency impressed to the upstream electrode 4 and the downstream electrode 6 with the plasma generator 1, is used. It is made the high voltage by the transformer 33 in the plasma generator 1, and the rectification coil 22 rectifies this high voltage, it is made alternation power by the output of the contact breaker 21 which has the power transistors 41, 42, and 43 which carry out on-off actuation with the signal sent with the high periphery oscillator 20 there, the high voltage is impressed to the upstream electrode 4 and the downstream electrode 6 by the RF, and the plasma generates the power of a generator.

[0032] Moreover, the engine incorporating this DPF equipment delays that fuel-injection timing, and is NOX. While making generating control, it has the property to which generating of HC is made to increase. This DPF equipment is NOX in an electrode 4, i.e., a wire gauze, a wire gauze 6, and the plasma generated in between. HC is made to react and it is NOX. Generating is reduced.

[0033] A controller 10 answers that uptake of the particulate more than the specified quantity beforehand decided to be a filter 3 was carried out, generates the plasma the upstream wire gauze 4, the downstream wire gauze 6, and in between, carries out reaction disappearance of the particulate matter by which uptake was carried out to the body 5 of a filter between the upstream wire gauze 4 and the downstream wire gauze 6, and is controlled to reproduce the body 5 of a filter. The particulate amount of uptake to a filter 3 is detectable by the sensor which calculates the pressure ratio of the pressure detected with the pressure sensors 9 and 11 which detect exhaust air pressure by the controller 10, or detects filter flow resistance. When reproducing the body 5 of a filter, it is not illustrating, but recycling of the exhaust gas of the pressure regularity by which was purified from the downstream of a filter 3 and atmospheric-air disconnection was carried out is carried out with a pump to the upstream, and while supplying the oxygen for playback, heating incineration of the particulate matter in which uptake is carried out to the filter 3 by the plasma generated at the upstream wire gauzes 4 and 6 can be carried out. Furthermore, although not illustrated, it can also constitute so that it may switch to the DPF equipment which juxtaposes this DPF equipment, carries out pair arrangement, and carries out uptake of the particulate matter, and the DPF equipment which performs playback and may operate.

[0034] Moreover, although the yield of the particulate matter in the engine speed detected by the rotation sensor 18 and the exhaust gas which occurs with an engine according to the operational status of the engine load detected by the load sensor 19 changes, a controller 10 The plasma generator 1 is controlled according to the amount of the generated particulate matter, and the amount of the particulate matter with which uptake of the filter 3 was carried out, the generating condition of the plasma is controlled, the particulate matter in exhaust gas is always extinguished good, and a filter 3 is reproduced. For example, when the circulating water temperature of an engine load immediately after the time of a partial load and starting is low, the plasma generator 1 is impressed to the wire gauzes 4 and 6 of an electrode, generates the plasma, promotes disappearance of the particulate matter, and promotes oxidation of HC.

[0035]

[Effect of the Invention] While SPM by which uptake was carried out with the filter and uptake was carried out reacts using plasma energy, and SPM contained in the exhaust gas discharged from a diesel power plant since the DPF equipment by this invention was constituted as mentioned above oxidizes and makes it disappear, ignition combustion is carried out, it is incinerated, and a filter is reproduced. A plasma generator impresses the high voltage by the RF the upstream wire gauze and downstream wire gauze which put the body of a filter, and in between, and makes the field of the body of a filter generate the plasma. Therefore, by plasma energy, ignition combustion is carried out, it can purify to clean exhaust gas, and SPM which

exists in the field of an upstream wire gauze, a downstream wire gauze, and the body of a filter of a between, and SPM with a small particle size of 0.25 micrometers or less which poses a problem especially are caused neither for reaction disappearance nor environmental pollution which injures health.

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[Translation done.]

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DRAWINGS

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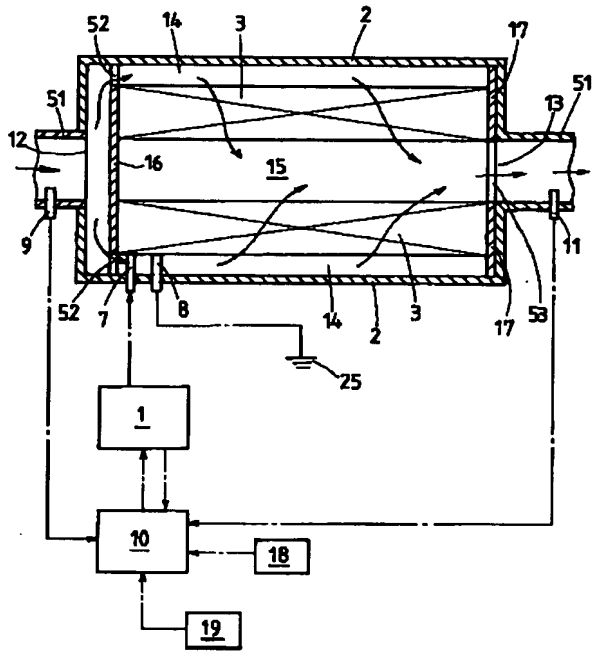
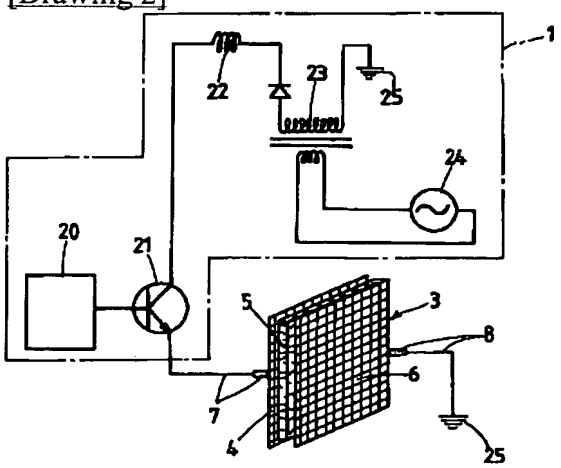
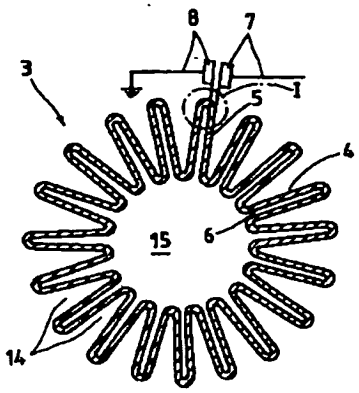
[Drawing 1]




[Drawing 2]




[Drawing 3]

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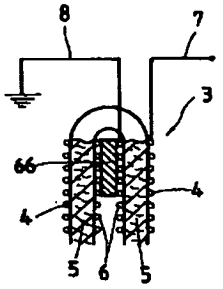


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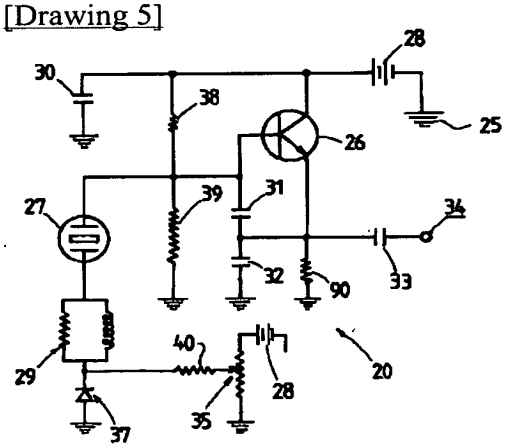
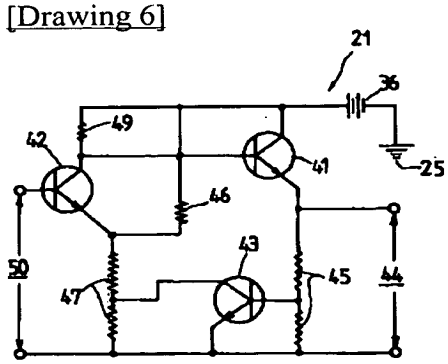



[Drawing 6]

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